Journal of Economics, Management Sciences and Procurement *Volume 4, Issue I, 2025*

pp. 219-231

Effect of Inventory Management Practices on Procurement Performance of Public Level Four Hospitals in Kisii County, Kenya

Article history: *Revised format: 17th Jan 2025, Available online: 16th May 2025*

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Abstract:

Purpose: *The study aimed to examine the effect of inventory management practices on the procurement performance of public level four hospitals in Kisii County, Kenya. Specifically, it investigated the influence of safety stock ordering and economic order quantity (EOQ) practices.*

Material/methods: *A descriptive survey research design was employed. The study targeted all 177 supply chain management officials in public level four hospitals in Kisii County. Using a stratified simple random sampling technique, a sample size of 175 respondents was selected. Primary data were collected using a structured, close-ended questionnaire, which was pretested for reliability and validity. Data were analyzed using descriptive statistics and presented in tabular form. Inferential statistics, including regression analysis, were conducted to assess the significance and strength of relationships between inventory management practices and procurement performance.*

Findings: *The results indicated that both safety stock ordering and EOQ practices had a positive and statistically significant effect on procurement performance. These practices contributed to improved stock availability, reduced holding costs, and enhanced order fulfilment.*

Conclusion*: Effective inventory management—specifically through systematic safety stock ordering and the application of EOQ principles—substantially improves procurement performance in public level four hospitals. These practices help minimize stockouts and optimize inventory costs.*

Value: *This study provides empirical evidence supporting the strategic role of inventory management in public healthcare procurement. It offers practical recommendations for institutionalizing EOQ-based ordering systems, formalizing safety stock reviews, and implementing training and decision-support tools to align inventory practices with consumption trends and service delivery demands.*

Keywords*: Inventory Management Practices, Procurement Performance, Public Hospitals, Safety Stock Ordering, Economic Order Quantity*

Paper Type: *Research Article*

Recommended citation: Ogendi, S. O., & Juma, D. (2025). Effect of inventory management practices on procurement performance of public level four hospitals in Kisii County, Kenya. *Journal of Economics, Management Sciences and Procurement*, *4*(1), 219–231.

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1.1.Introduction

Procurement serves as a cornerstone for organizational success by ensuring that projects run smoothly and assets are managed efficiently (Kylindri et al., 2012). In the public sector—where service delivery underpins socioeconomic development—effective procurement directly supports broader development goals (Ngacho & Das, 2014). As a business management function, procurement encompasses the identification, sourcing, and oversight of external resources, leveraging market opportunities to secure the best value for both organizations and stakeholders (CIPS). Enhanced procurement performance not only reduces costs but also boosts profitability (Zai, 2021).

Over time, the procurement role has shifted from reactive purchasing to a strategic enabler of organizational objectives (Dimitriades & Maroudas, 2017). This strategic evolution has been accompanied by legal and institutional reforms geared toward transparency and effectiveness, such as the establishment of clear procurement frameworks and oversight bodies (Hunja, 2019). In both economic downturns and growth phases, procurement excellence becomes vital for cost containment, efficient operations, and sustaining competitive advantage (Schiele & McCue, 2016).

Measuring procurement performance involves assessing how well purchasing activities meet project objectives—delivering value for money, maintaining quality, controlling costs, and adhering to schedules (Schiele, 2007; Shalle et al., 2014). Key metrics often combine fiscal data (e.g., cost savings, budget adherence) with non-fiscal indicators (e.g., supplier lead times, flexibility) (Hartmann et al., 2012). When procurement is well-organized—via rigorous planning and scheduling—it achieves the "faster, better, cheaper" trifecta, directly enhancing overall organizational performance (Samson et al., 2016; Okinyi & Muturi, 2016).

Inventory management, a critical subset of procurement, focuses on balancing supply and demand to minimize stock-outs and excess carrying costs (Danese & Kalchschmidt, 2017; Coyle et al., 2018). Employing policies like FIFO and setting optimal order quantities drives faster turnover and cost reductions of 10–40% (Ofori-Ayeh, 2016). Effective inventory systems—whether just-in-time, material requirements planning, or a hybrid vendor-managed approach—ensure that materials are ordered, stored, and issued at the right time, cost, and quality (Shalle et al., 2014; Waters, 2023).

Finally, advanced techniques such as Economic Order Quantity (EOQ), demand forecasting, and Activity-Based Costing (ABC) further refine inventory and procurement decisions by aligning order sizes with holding and ordering costs and attributing overheads to specific activities (Mwangangi & Senelwa, 2018; Ezeala et al., 2022). In Kenya's public healthcare sector—operating under the Public Procurement and Disposal Act—a mix of annual, scheduled, and perpetual purchasing systems must navigate both local and international supply networks. Strengthening these inventory and procurement strategies is essential for delivering timely, cost-effective healthcare services and maintaining compliance with national procurement regulations (PPOA, 2005).

Optimized inventory management—through rigorous stock audits, optimal safety-stock levels, and strict FIFO practices—directly underpins strong procurement performance by ensuring quality service delivery, cost reduction, and reliable stock availability (Meng, 2016). However, Kenyan public hospitals frequently fail to realize these benefits, lacking one-stop medical services, sufficient skilled staff, and efficient stock

controls; they face prolonged inventory trace times, patient referrals to private pharmacies for unaffordable medicines, and chronic stock-outs (Tokar et al., 2011; Pujara & Kant, 2015). In Kisii County, a physician-patient ratio of 1:2,000, limited transport resources, and unpredictable funding further hinder timely procurement and service access (Kisii County Government, 2018). Although government budgets aim to support healthcare, procurement remains plagued by waste, delays, and opaque processes. Prior studies—such as India's vendor-managed inventory adoption (Vikram et al., 2018), Nigerian bottling-industry optimizations (Adeyemi et al., 2010), and Ugandan supply-chain integrations (Richey et al., 2009)—highlight inventory strategies' potential but often overlook stock-audit practices or robust theoretical frameworks, while Ng'ang'a's (2016) descriptive analysis of Kenya's public sector lacks inferential rigor. In light of these gaps and persistent bottlenecks, the current study investigates how tailored inventory management practices affect procurement performance in Kisii County's public hospitals.

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1.2. Theoretical Review

The Theory of Constraints (TOC) posits that every organizational system has at least one "weakest link" or bottleneck that limits overall performance (Goldratt, 1990). A constraint can be any factor—material shortages, limited funding, logistical delays, poor policies, or even entrenched behaviors—that prevents a project or process from achieving its goals (Whelton et al., 2004). TOC's core principles—convergence, consistency, and respect—guide managers to identify these constraints systemically and then either eliminate or manage them to optimize throughput, inventory, and operating expenses (Souza & Pires, 2010). In project procurement—particularly within complex construction environments involving multiple stakeholders—unaddressed constraints can lead to misunderstandings, cost overruns, and delays (Yates, 2002; Davis & Mabin, 2009). While critics note that continuously identifying and resolving successive constraints can be challenging (Hilton et al., 2008), TOC's focus on focused improvement and ongoing constraint removal has been shown to boost capacity, reduce

needless costs, and enhance procurement certainty (Parker et al., 2015). This study will apply TOC to build a performance framework for evaluating procurement in CDF-funded projects in Kisii County.

Supply Chain Management (SCM) theory provides a complementary lens by framing procurement as part of a coordinated network of suppliers, manufacturers, distributors, and end users—each linked through flows of products, information, and finances (Mentzer et al., 2001; Stock & Boyer, 2009). SCM extends beyond traditional purchasing to emphasize process orientation, customer focus, and cross-organizational collaboration, leveraging ICT technologies for seamless integration (Sanderson et al., 2015; Parkhi et al., 2015). Foundational SCM concepts—plan, source, make, deliver—assume that network members, motivated by mutual economic benefit, will share information and resources to create collective value (Stewart, 1997; Sanderson et al., 2015). In Kenya's medical supply chain, for example, KEMSA consolidates orders from county health facilities, procures from prequalified suppliers, and distributes through regional warehouses, requiring rigorous coordination at each handoff to ensure timely, cost-effective delivery of essential medicines (KEMSA, 2020). By integrating TOC's bottleneck-focused improvements with SCM's network-wide collaboration, this research examined how constraints and coordination dynamics jointly shape procurement performance in public health projects.

2.1. Empirical Review (hypotheses development)

Inventory management has been shown to directly influence service delivery in public health settings. Babirye Geraldine's (2017) case study of Uganda's Mulago National Referral Hospital found that efficient stock requisitioning, regular stock taking, and proper storage correlated with greater availability, accessibility, and timeliness of services. Yang et al. (2016) further emphasize that drug and consumable inventories dictate which health services can be offered when demand arises, while Rujumba (2014) notes that—even under national procurement guidelines—individual hospitals must develop and adhere to their own inventory schedules to ensure timely requisition and delivery of essential supplies.

Research in other sub-Saharan contexts underscores the necessity of balancing inventory levels to avoid both shortages and excess. Mungu's (2013) study in Bungoma East revealed that robust supply-chain practices help maintain optimal drug stocks, and Cheruiyot (2013) argues that effective information systems and control procedures are critical for weighing inventory costs against operational benefits. Conversely, Ogoye (2014) warns that understocking disrupts services, erodes customer goodwill, and drives up ordering costs through emergency procurement—demonstrating that both over- and under-inventory carry significant risks.

Beyond healthcare, broader supply-chain research highlights the challenge of managing inventory volatility and maintaining lean operations. Wong et al.'s (2005) longitudinal case in Denmark's toy industry found that while just-in-time, one-off, and mixed ordering models each offer advantages, none fully address seasonal and demand fluctuations. Historical analyses in the US (Lai & Cheng, 2009) similarly show that extreme stocking levels—too high or too low—undermine efficiency, whereas moderate inventory enables minimal carrying costs, reduced lead times, and alignment with total quality management principles (Datta, 2007).

Local Kenyan studies have begun to explore inventory practices and their performance impacts in non-health sectors but leave gaps in understanding public-hospital contexts. Onyango (2011) linked streamlined stock levels and demand forecasting to improved performance in the cement industry, and Kitheka (2012) demonstrated that inventory-management automation boosts supermarket efficiency. Foundational practices—such as annual or cycle stock taking (Coulter & Shepherd, 2005), preventive measures against theft and obsolescence (Hsieh, 2002; Lin & Yao, 2014), and optimized storage and transport procedures (Dwyer & Christopher, 2010; Muyingo et al., 2012; Wales, 2015)—are critical yet under-examined in Kenyan public hospitals. The study hypothesized that:

H01: Safety stock ordering has statistically significant effect on procurement performance of public level four hospitals in Kisii County.

Economic Order Quantity (EOQ) is a foundational inventory-management model that determines the optimal order size to minimize the combined costs of ordering and holding stock (Mwangangi & Senelwa, 2018; Noe et al., 2010). By balancing purchase, delivery, and storage expenses, EOQ helps organizations procure enough inventory to leverage volume discounts without incurring excessive carrying costs. This precise calculation underpins lean, just-in-time supply practices—exemplified by Toyota's zero-holding-cost philosophy—and ensures timely replenishment cycles (Sporta, 2018; Schonberger, 2008; Gonzalez & Gonzalez, 2010).

Empirical studies across sectors affirm EOQ's role in optimizing supply-chain performance. Meng (2006) found that applying EOQ in a Swedish energy plant linked lower inventory costs to enhanced procurement outcomes and overall chain efficiency. Bachetti et al. (2010) demonstrated that logical, EOQ-based replenishment schedules virtually eliminate storage costs by syncing deliveries with usage. These international findings suggest that EOQ adoption can deliver substantial cost savings and operational agility in diverse organizational contexts.

In the Kenyan context, several studies report a positive relationship between EOQ practices and procurement or financial performance. At Vihiga County Referral Hospital, Achevi, Juma, and Otinga (2021) showed that just-in-time methods, followed by EOQ and ABC analysis, significantly predicted procurement-function effectiveness. Korir, Kaitany, and Sang (2021) similarly found EOQ stock-control techniques correlated positively with service performance in level-five hospitals. Outside healthcare, Kisaka (2016) documented raw-material cost savings in dairy firms through EOQ adoption, Padachi (2018) linked EOQ metrics to improved profit margins in Mauritian manufacturers, and Thogori and Gathenya (2018) observed that disciplined inventory controls at Del Monte Kenya boosted customer satisfaction. Together, these studies suggest that implementing EOQ—and its companion, the reorder-point model—in Kisii County's public hospitals could strengthen procurement performance, reduce stock-outs, and enhance service delivery. Thus, the study proposed the following hypothesis

H2: Economic order quantity practice has statistically significant effect on procurement performance of public level four hospitals in Kisii County.

2.2. Conceptual Framework

In this study the dependent variable public hospital procurement performance, and it is called dependent because any successful firm procurement performance depends on many different factors which are termed as independent variables. The independent variables in this case are the core factors that lead to success of inventory management, and they include: safety stock holding, EOQ, ABC and inventory audit

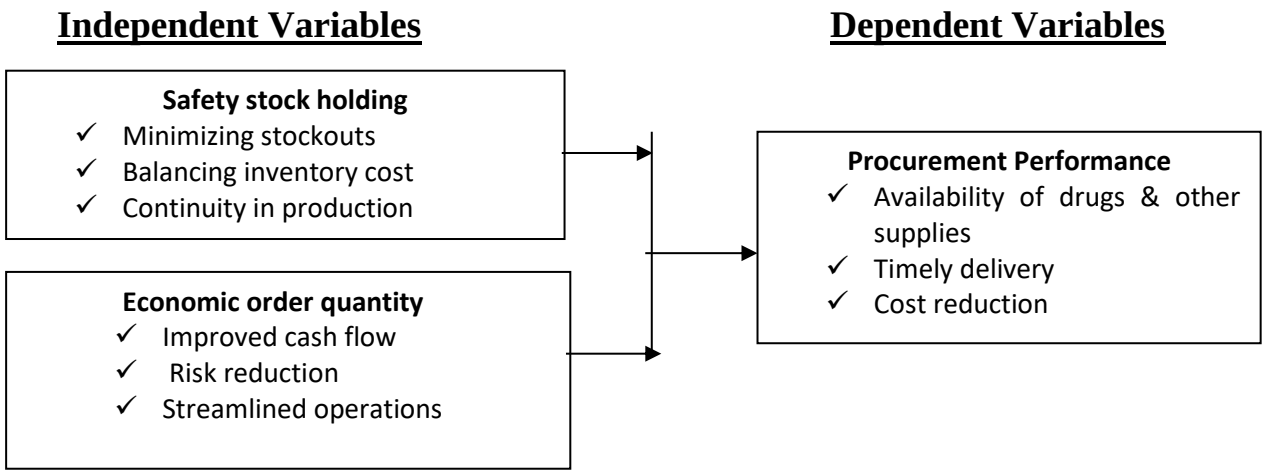

Fig 2.1: Conceptual Framework

3.1. Research Methodology

Research This study employed a mixed-methods design, combining descriptive research with both quantitative and qualitative approaches to enhance validity, hypothesis testing, and generalizability (Neville, 2017; Askarzai & Unhelkar, 2017). It was conducted in Kisii County's nine Level-4 public hospitals—chosen for their high malaria prevalence and critical role in regional healthcare (KNBS, 2019)—and targeted 177 health professionals including pharmaceutical technologists, stores/procurement officers, and clinical officers (Matula et al., 2018). Using Slovin's formula and adjusting for an anticipated 10.6% nonresponse rate, a stratified random sample of 175 respondents was drawn proportionally across hospitals, yielding 175 distributed questionnaires. Data collection utilized structured and open-ended questionnaires to capture both numerical metrics and in-depth insights (Weller et al., 2018; Pandey & Pandey, 2015), and a 10% pilot test established instrument clarity and reliability (Churchill, 2002; Viechtbauer et al., 2015), with Cronbach's alpha ≥ 0.70 deemed acceptable (Surya, 2016). Validity assessments included face, construct (convergent and discriminant), and internal validity checks via expert reviews, triangulation, and member checking (Mohajan, 2017; Creswell & Miller, 2000). Upon collection, quantitative data were processed and analyzed in SPSS v28, where descriptive statistics first characterized key variables and inferential regression analyses then tested the significance of inventory management practices on procurement performance. This is as indicated in the equation below:

$$\mathbf{Y=ß0 + ß1x1 + ß2x2 + \varepsilon}$$

Where: **Y** refers to Procurement Performance
ß0 is a constant, the intercept between x and y axis
ß1…… ß3 are the correlation coefficients.
X1- safety stock holding
X2 – economic order quantity

e – the error term

4.1. Results And Discussions

In general, a total of 175 questionnaires were distributed to respondents in different level four hospitals in Kisii County. All questionnaires were received in 9 hospitals and at the time of analysis 125 questionnaires were found to be completed and returned for analysis while 50 questionnaires were either not returned or were incomplete The result demonstrated that most respondents were willing and positive in taking part in the study with a valid response rate of 71.42%. As supported by the study by Mugambi 2017 and Kitenga *et al*.,2020 who stated that a response rate of 70% and above is good enough for data analysis and reporting.

4.1.1. Descriptive Analysis

The study used descriptive statistics to test the level and extent to which each variable is being adopted in hospitals in Kisii County.

The study used mean and standards deviation to determine the extent to which safety stock can influence procurement performance in Kisii County and the result was as shown in table 1

Table 1: *Safety Stock Ordering*

	Mean	**Std. Devi**
The hospitals always have safety stocks of all their inventories	2.13	.950
Safety stock ordering absorbs the variability of customer demand.	3.27	1.124
More stock ordering is given for inventories with less accurate forecast.	3.37	1.248
Safety stock ordering is used to protect the hospital from stock-outs caused by inaccurate planning	4.13	.672
The hospitals strive to reduce the level of safety stock ordering to help keep inventory costs low.	3.32	1.112
High level of safety stock ordering leads to high holding costs for the hospital	3.41	1.165
High level of safety stock ordering leads to high customer satisfaction d the customer satisfaction in the company.	3.51	1.196

The result revealed that the hospitals always have safety stocks of all their inventories with a mean of 2.13 and SD of .950. Safety stock ordering absorbs the variability of customer demand with a mean of 3.27 and SD of 1.124. More safety stock ordering is given for inventories with a less accurate forecast with a mean of 3.37 and SD of 1.248. Safety stock ordering is used to protect the hospital from stock-outs caused by inaccurate planning with a mean of 4.13 and SD of .672. The hospitals strive to reduce the level of safety stock ordering to help keep inventory costs low with a mean of 3.32 and SD of 1.112. High level of safety stock ordering increases holding costs for the hospital with a mean of 3.41 and SD of 1.1165. While the high level of safety stock ordering leads to high customer satisfaction and customer satisfaction in the hospital

with a mean of 3.51 and SD of 1.196. This implied that safety stock ordering is moderately applied in Kisii county Hospitals.

The study sought to measure the extent of economic order quantity is applied and it was revealed as shown in table 1

Table 2: *Economic Order Quantity*

	Mean	Std. Dev
EOQ models are seen as a valuable tool for optimizing procurement performance, helping manufacturing companies to maintain competitiveness in the market	2.63	1.254
Manufacturers have leveraged EOQ principles to achieve cost savings in procurement, which has positively impacted their overall profitability	3.56	.919
The use of EOQ has enhanced collaboration with suppliers among large manufacturing companies, fostering stronger relationships and more reliable procurement processes	3.58	1.109
EOQ models have enabled manufacturing companies to make informed decisions regarding reorder points, resulting in reduced emergency orders and associated costs	3.53	1.133
By implementing EOQ strategies, manufacturing companies have witnessed improved cash flow management	3.14	1.384
EOQ calculations have contributed to reduced procurement lead times, allowing manufacturers to respond promptly to market demands and fluctuations	3.62	1.106
EOQ models are seen as a valuable tool for optimizing procurement performance, helping manufacturing companies to maintain competitiveness in the market	4.18	.784

It was revealed that: EOQ models are seen as a valuable tool for optimizing procurement performance, helping manufacturing companies to maintain competitiveness in the market with a mean of 2.63 and SD of 1.254. Manufacturers have leveraged EOQ principles to achieve cost savings in procurement, which has positively impacted their overall profitability with a mean of 3.56 and SD of .919. The use of EOQ has enhanced collaboration with suppliers among large manufacturing companies, fostering stronger relationships and more reliable procurement processes with a mean of 3.58 and SD 1.109. EOQ models have enabled manufacturing companies to make informed decisions regarding reorder points, resulting in reduced emergency orders and associated costs with a mean of 3.53 and SD of 1.133. By implementing EOQ strategies, manufacturing companies have witnessed improved cash flow management 3.14 and SD of 1.384. EOQ calculations have contributed to reduced procurement lead times, allowing manufacturers to respond promptly to market demands and fluctuations with a mean of 3.62 and SD of 1.106. EOQ models are seen as a valuable tool for optimizing procurement performance, helping manufacturing companies to maintain competitiveness in the market with a mean of 4.18 and SD of .784. This implied that implementation of economic order quantity was to a lower extent.

The study also attempted to find out the levels of procurement performance and results were as indicated in table 3.

Table 3: *Procurement performance*

	Mean	**Std. Deviation**
Proper inventory control can reduce cost of inventory	3.31	1.103
Proper inventory control ensures delivery of quality inventories/services	3.42	.952
Proper inventory control improves customer satisfaction	2.43	1.259
Proper inventory control contributes to timely delivery of services/materials	3.49	1.060
Proper inventory control leads to effectiveness of procurement processes	4.14	.826

Source: field data 2025

Result indicated that: Proper inventory control can reduce cost of inventory with a mean of 3.31 and SD of 1.103. Proper inventory control ensures delivery of quality inventories/services with a mean of 3.42 and SD of .952. Proper inventory control improves customer satisfaction with a mean of 2.43 and SD of 1.259. Proper inventory control contributes to timely delivery of services/materials with a mean of 3.49 and SD of 1.060. Proper inventory control leads to effectiveness of procurement processes with a mean of 4.14 and SD of .826. it was indicated that performance was low in Kisii county.

4.1.2. Correlations

The study conducted correlation analysis to determine the relationship between the study variables and result were as shown in table 4

Table 4: *Correlations*

		SSO:	EOQ:	PP:
SSO:	Pearson Correlation	1		
	Sig. (2-tailed)			
	N	125		
EOQ:	Pearson Correlation	.450**	1	
	Sig. (2-tailed)	.000		
	N	125	125	
PP:	Pearson Correlation	.320**	.603**	1**
	Sig. (2-tailed)	.000	.000	
	N	125	125	125

*. Correlation is significant at the 0.01 level (2-tailed).

Safety stock ordering had a weak positive relationship with procurement performance r=.320, p<.05. Economic Order Quantity had a moderate positive significant relationship with procurement r=.603: p<.05.

4.1.3. Regression

To assess the research model, regression was conducted using linear regression to predict the relationship and effect of each independent variable on the dependent variable and result was as shown in table 4.

Table 4: *Model Summary*

Model	R6	R Square	Adjusted R Square	Std. Error of the Estimate
1	.640[a]	.409	.389	.498

a. Predictors: (Constant), IA: Safety stock ordering, Economic Order Quantity

The results showed that inventory management practices had predictor powers on procurement performance as it accounts for 40.9% while the rest can be by other factors covered in this study. The relationship between dependent and dependent variable was moderate r=.64.

Model fitness was determined using ANOVA as shown in table 5

Table 5: *ANOVA[a]*

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	20.607	4	5.152	20.773	.000[b]
	Residual	29.760	120	.248		
	Total	50.367	124			

a. Dependent Variable: PP: Procurement performance

b. Predictors: (Constant), IA: Inventory Audits, SSO: Safety stock ordering, ABC: Activity Based Costing, EOQ: Economic Order Quantity

The study shows F calculated higher than critical F 20.773 p<.05 hence the model was found to be fit in predicting the effect of dependent variable on dependent variable. The study used regression coefficient to determine the effect of Inventory management practices on procurement performance as shown in table 6.

Table 6: *Coefficients*[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.709	.335		2.117	.036
	SSO: Safety stock ordering	.036	.087	.033	.417	.677
	EOQ: Economic Order Quantity	.460	.094	.445	4.879	.000

a. Dependent Variable: PP: Procurement performance

The study revealed that holding all other factors constant procurement performance was .709. An increase in safety stock ordering by one unit led to 3.6% increment in procurement performance which was insignificant thus fail to reject null hypothesis. One unit increase in economic order quantity led to 46% increment in procurement performance which was significant, hence the null hypothesis was rejected.

5.1. Conclusion

The study sought to determine the effect of safety stock ordering on procurement performance of public level four hospitals in Kisii County. The study concluded that Safety stock ordering is used to protect the hospital from stock-outs caused by inaccurate planning. Safety stock ordering had a weak positive relationship with procurement performance. Safety stock ordering had no significant effect on procurement performance. The study sought to establish the effect of economic order quantity on procurement performance of public level four hospitals in Kisii County. It was concluded that: EOQ models are seen as a valuable tool for optimizing procurement performance, helping hospitals to maintain competitiveness in the market. Economic Order Quantity had a moderate positive significant relationship with procurement performance. Economic order quantity had a significant effect on procurement performance.

6.1. Recommendations

The study sought to determine the effect of safety stock ordering on procurement performance of public level four hospitals in Kisii County. The study recommended that hospitals should think of having safety stocks of all their inventories to enhance efficiency. The study sought to establish the effect of economic order quantity on procurement performance of public level four hospitals in Kisii County. It was recommended that: EOQ models be seen as valuable tools for optimizing procurement performance, helping hospitals to maintain affordability.

6.2. Future Research

A study has been recommended to factors in other study designs like longitudinal. Factor in other theories and some inventory management which were not covered in the current study.

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